APPLICATION #______

DEADWOOD HISTORIC PRESERVATION COMMISSION

DEADWOOD NOT-FOR-PROFIT GRANT PROGRAM FOR
SITES NOT ELIGIBLE FOR STATE PROPERTY TAX MORATORIUM

Application

The Deadwood Historic Preservation Commission reviews all applications. Please read the attached Policy Guidelines and provide the requested information below.

1. Property Address:

Street	City	State	Zip
715 Main St.	Deadwood	SD	57732

2. Applicant Details: **TODAY'S DATE:** 1/31/2021

Name	Daytime Telephone	E-mail Address	
Masonic Center Association	605-720-3646	casey.derflinger@fib.com	
Street	**City**	**State**	**Zip**
715 Main St.	Deadwood	SD	57732

3. Owner of Property:**

****NOTE:** Applicant must own/retain property;

OR

Applicant must be leasing or renting the property and have written permission from the owner to conduct the work;

OR

Applicant must have a firm written commitment with the owner to purchase the property.

(Complete 'Owner of Property' only if different from that of applicant)

Name ________ Daytime Telephone ________ E-mail Address ________

Street ________ City ________ State ________ Zip ________

1. Property Address

715 Main St.	Deadwood	SD	57732
Street	City	State	Zip

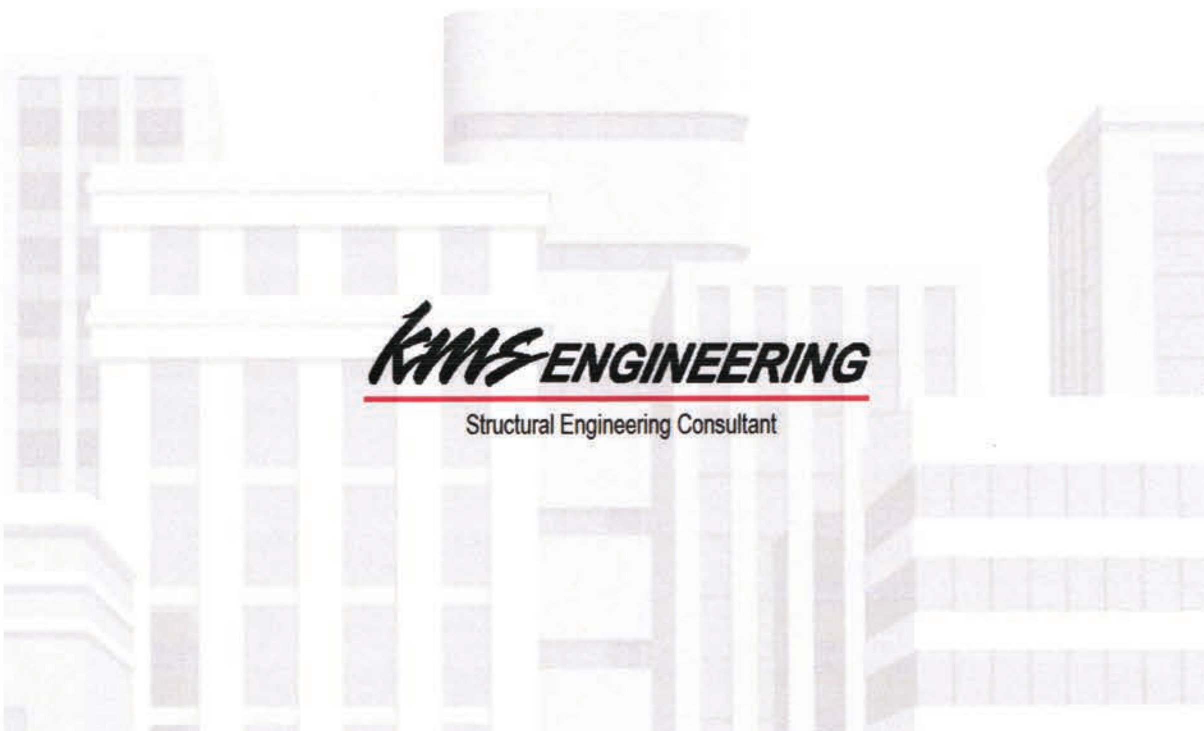
2. Description of work to be performed as part of this project:

In mid-October of 2020, we discovered the ceiling on the third floor was falling in. We contacted our insurance company who sent an adjustor and structural engineer to survey the damage. The engineer indicated that one of the girder trusses was broken on each end and was falling through the ceiling. Another girder truss was also cracked and was starting to fall in. The engineer indicated that this was an emergency situation and that we would be required to shore up the 2 trusses immediately due to safety concerns. He also indicated that the 2 trusses would need to be braced on each floor, from the basement to the third floor. We contracted with CVD Construction of Spearfish to install the bracing, and this has been completed. The reason we are requesting a grant is due to issues we've encountered with our insurance company, Philadelphia Insurance. The structural engineer they hired believes the truss damage was due to the Atlas snow storm in 2013, and since we've only been with Philadelphia since 2018, they suggested we contact our former insurance company Columbia Insurance. Columbia will be sending their adjustor and structural engineer to survey the damage, but in the meantime, we have shored up the trusses as directed by Philadelphia structural engineer, the building has been stabilized, and we do need to pay the contractor for his work. We realize we only have $15,645 in available grant funds, but are requesting an exception due to the emergency situation we were faced with. Thank you.

3. Project budget – itemized and showing disbursement of funding

Description *(i.e. roof)*	Grant	Total
Bracing trusses	$41,237.07	$41,237.07
	$	$
	$	$
	$	$
	$	$
	$	$
Total:	$41,237.07	$41,237.07

4. Total Project Cost: $41,237.07 **Grant Amount:** $41,237.07



KMS ENGINEERING

Structural Engineering Consultant

KMS ENGINEERING
Structural Engineering Consultant

3500 S. Phillips Ave., Ste. 211 • Sioux Falls, SD 57105
phone 605-334-3210 • fax 605-334-3760 • cell 605-366-9394
kmsengineering@sio.midco.net
www.kmsengineering.net

December 22, 2020

Mr. Gary Grabauskas
Philadelphia Insurance Companies
One Bala Plaza, Suite 100
Bala Cynwyd, Pennsylvania 19004

RE: Summary Report
Extent of Damage to Wood Girder Truss
Insured: Masonic Center Association, 715 – 717 Main St., Deadwood, SD
Claim Number: PHNP20121407260
KMS Engineering File Number: 20-023

Dear Mr. Grabauskas:

KMS Engineering received an assignment from Mr. Mike Nelson of Crawford & Company on December 4, 2020 to review the extent of damage to the wood girder truss at the above subject property. The insured was Masonic Center Association. In response to this request, a site visit was made on December 10, 2020. Representatives from the Masonic Center were present during all or a portion of the evaluation. Those in attendance were Mr. Casey Derflinger, Mr. Robert Tesch, Mr. Brad Steinlicht, and Mr. Jeff Schroder. Also in attendance was Mr. Mike Nelson. The scope of KMS Engineering's services was to review the reported damage to wood girder truss and determine the probable cause for failure.

This report summarizes the findings of our investigation, and presents the background information, and recommendations.

Background

The building was a three story, masonry and brick structure approximately 120 – plus years old. Currently the structure serves as an office and convergence center for the local Masons. The front of the structure faced west along Main Street. Building dimensions were approximately 115'-0" along the north and south walls and 50'-0" along the east and west walls. At the east end of the building a performance flyway had been added which towered over the lower roof approximately 14'-0".

Mr. Tesch reported that the lower roof had been reroofed in 2013. It was uncertain if the previous roofing had been removed prior to the installation of the new roof membrane. The roof membrane that is currently in place is called thermoplastic polyolefin (TPO). During the winter months of 2019-2020 he also reported that a roofing company had been on the lower roof to repair several leaks. There were no reports of roof distress made at that time.

The reported date of the truss girder failure occurred approximately mid- to late October 2020. Deflection and loss of the ceiling tile in the auditorium along with vertical cracks in the plaster at the north and south walls were the first indication of a roof problem.

Mr. Tesch reported that a significant snow storm event occurred approximately 5 years prior to this date.

Site Evaluation / Observation

No destructive investigation was performed on the building components or structural members. Observations were made only on components still in place in the structure and readily visible.

Observation was made at the auditorium for the condition of the ceiling tile and wall plaster. At the north end of the girder truss, the ceiling was significantly deflected downward. The ceiling tile joints were opened with the tile being displaced or missing. At the north and south walls, vertical crackage in the plaster was observed below each end of the girder truss.

Access was made to the interstitial space between the roofing framing and the interior ceiling framing. Roof framing consisted of the exterior roofing material and membrane, 1-inch wood board sheathing, and 2x10 and 2x12 wood roof joists spaced at 16-inches on center. The ceiling framing consisted of plaster or ceiling tile, 2x8 wood ceiling joists spaced at 16-inches on center, and on one side of the girder truss being investigated 1-inch wood boards rested on top of the ceiling joists. At a number of locations on both sides of the girder truss vertical wood supports had been installed from the roof joists down to the ceiling joists. There was what appeared to be left over duct work and other miscellaneous wood pieces located in this space.

The girder truss under investigation spanned from the north wall to the south wall. These exterior walls were constructed of multi-whythe bricks. Wall thickness was approximately 10-inches. Adjacent girder trusses were located approximately 14’-0” on either side of this girder truss. Distance from the girder truss to the east to the flyway wall was approximately 11’-8”. The wood boards on top of the ceiling joist were located to the west side of the girder truss under investigation.

The girder trusses were all hand-framed in the same fashion. Overall height of the girder trusses was 69-inches. Top and bottom chords of the girder trusses were constructed with six wood 1x12 boards. These boards were spaced to allow for vertical and diagonal girder truss members to extend to the top and bottom chords. Vertical panel points were located at 68-inches on center from the end panel points, which were located 12-inches from the very end of the girder truss. The end panel points at each end of the girder truss were constructed with four 1x12 boards. At the interior panel points the verticals were constructed with two 1x12 boards. Again, these boards were spaced to allow extension from the top to bottom chords and between the top and bottom chords. Between the vertical panel points, diagonal members had been constructed and extended from the bottom of one panel point upward to the top of the adjacent panel point. These members were constructed with four 1x6 boards at the end panels and three 1x6 boards at the interior locations. These diagonal members were also spaced apart as described above, however, at the mid-length of these members they had been bolted together. Additionally, between the vertical panel points 1x6 boards were placed diagonally in two directions to form a lattice configuration.

The top and bottom chords of the girder truss extended into the exterior brick wall at each end and were mortared in place. There was no other attachment between the girder truss and the walls observed. At the top and bottom chords on each side of the girder truss a 2x4 was placed for the full length and served as the bearing ledge for the ceiling and roof joists on each side.

At the north end of the girder truss the first panel diagonal boards had buckled to the east and were broken. The end vertical boards were also broken. Both the top and bottom chords were broken at the second panel point. Deflection of the girder truss had occurred and was approximately 12-inches downward. Both the top and bottom chords had pulled out of the brick wall. At the south end, the diagonal boards of the first panel had buckled toward the east and had cracked. This same condition was observed on the outside board of the diagonal of the first panel at the north end of the girder truss to the east of the girder truss under investigation.

Access to the exterior of the low roof was provided. Roof slope was downward from the west to the east was approximately 0.25-inch per 1’-0”. A short parapet wall existed around the north, west, and south sides of the roof. Maximum height of the parapet was generally 24-inches and stepped down on the north side, however, at the south east corner of the roof the parapet was approximately 55-inches high. This allowed for water flow to be directed to the north east corner where an interior drain inlet was located. The flyway wall at the east end of the low roof extended approximately 14'-0" above the lower roof.

At the north end of the subject girder truss the roof was observed to have deflected downward approximately 12-inches. There was noticeable sediment markings on the roof membrane at this location indicating long term water ponding.

Research of rain and snow storm amounts was performed to verify the large snowfall amount as stated by Mr. Tesch. Records from the National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA0 and the National Centers for Environmental Information (NCEI) were reviewed. These records date back as far as 1900 and provide detailed daily information related to rainfall, snow, hail, and pellet amounts as well as the amount of snow ground cover at the time of observation. The dates reviewed for this investigation were from 2000 to 2020 and include the towns of Deadwood and Lead, approximately three miles away.

The records show that on October 4 and 5, 2013 a significant snow event occurred. On October 4 snowfall amounts in the vicinity were recorded up to 42-inches. On October 5 additional snowfall amounts were recorded up to 13-inches. In addition, on the 4th there was 3.86-inches of rain and on the 5th there was 2.26-inches of rain. Temperature range for this event were 26-degrees Fahrenheit (F) for the low and 41-degrees F for the high. The total ground snow cover observed on October 5 was up to 55-inches.

A second significant snow event occurred between December 23 to 25, 2014. During this event snowfall was recorded up to 22.1-inches on the 23rd and 3.5-inches on the 25th. Rainfall amounts were 1.13-inches and 0.34-inches respectively. Temperature ranged from 15-degrees Fahrenheit (F) for the low and 45-degrees F for the high. Total ground snow covered observed on the 23rd was up to 25-inches as a result of this event and a pre-existing amount of 4-inches.

A third significant snow event occurred between February 25 to 27, 2020. During this event snowfall was recorded up to 17-inches on the 25th, 3-inches on the 26th, and 6-inches on the 27th. Rainfall amounts were 0.82-inches, 0.12-inches, and 0.25-inches respectively during this period. The total ground snow cover observed on the 27th was up to 35-inches. Temperature range during this period was -6-degrees Fahrenheit (F) for the low and 30-degrees F for the high. On the days just prior to this snowfall event the records show up to 13-inches of total ground snow cover was observed as a result of 1.81-inches of rainfall and 25.5-inches of snowfall during the previous sixteen days.

A fourth event occurred on April 12, 2020 when 13-inches of snowfall occurred with 0.84-inches of rainfall. Temperature range during this event ranged from 12-degrees Fahrenheit (F) as a low and 33-degrees F for the high.

A final event occurred at the approximate time of the observed girder truss failure. This event date was between the dates of October 22 to 26, 2020. During this event 0.77-inches of rainfall occurred and 16-inches of snowfall occurred. Temperatures during this event ranged from a low of 3-degrees Fahrenheit (F) to a high of 23-dgrees F.

Discussion / Analysis
Based on the data found in the snowfall and rainfall records the probable cause of failure was due to overloading of the girder truss from these events. The first observed event in 2013 yielded over 55-inches of snow with 5.12-inches of rain. This is a significant amount of what is considered live load (loads that are transient, i.e., come and go). The combination of snow plus rain would produce a high moisture content in the snow yielding a snow weight of up to 57.5-pounds per cubic foot (pcf) or roughly 4.8-pounds per square foot (psf) per 1-inches of depth. In this instance the snow load could be as much as 263.7-pounds per square foot.

Ponding, as caused by the deflected truss and water flow (from snow melt or rain events), would yield up to 62.4-psf of load on the truss.

It is not very probable that the 263.7-psf load was realized on the roof during this storm, had that occurred the trusses would all have failed. It is however probable that, based on the parapet height and a probable wind, that the load could have been as much as 115.0-psf (4.79-psf per inch multiplied by parapet height of 24-inches). Generally, in this area of the country trusses are designed for a snow load of 22-psf, therefore, the 115.0-psf would have caused the truss to initially break.

The construction of the girder truss end panel diagonals did not connect the individual pieces of wood together. This created a condition where the load transfer through the diagonal would be divided between each of the four pieces. Each piece of the diagonal would function independently of the other pieces. The probable failure cause was a progressive breakage of the individual pieces as when one piece failed the remaining pieces would be required to transfer the load. This condition would eventually overload the remaining pieces and cause them to break.

Therefore, with the truss initially broken in 2013, and it may or may not have deflected the truss as observed at the south end of the investigated truss and the north end of the adjacent truss, north end. The subsequent snowfall and rainfall events as documented above caused the continued failure of the diagonal chord pieces at the north end until all pieces broke. Once the final diagonal piece of wood broke for complete failure is when the girder truss finally deflected downward.

Recommendations

KMS Engineering recommends that additional block and shoring be placed to support the entire length of the girder truss. Shoring should be located on each side of the girder truss and support the roof joists as well as the ceiling joists. The shoring should extend to the lowest level of the structure as subsequent floor framing may not be adequate to support the roof ceiling framing and live loads. This shoring should be placed such that removal and reconstruction of the girder truss can be performed. Deflection of the roof structure has occurred and lifting of the roof structure will be required. Lifting of the roof structure will require the use of hydraulic jacks and adjustable shoring. During this period there should be very limited use of the facility. Additionally, snow and rain loads should be removed as quickly as possible.

Attribution

The initial overloading of the girder truss that occurred during the October 2013 event began the progressive failure. This event most probably broke the end panel diagonal chord members, similar to what was viewed at the girder truss to the east of the subject girder truss. There was no noticeable deflection of the girder truss after this event, however, the broken chord members would have been obvious if observations had been made.

The second snow event during December 2014 furthered the end panel diagonal chord breakage. Several more of the diagonal chord members would have broken, most probably all four of the wood pieces.

With the end panel diagonal members compromised after the second snow event, the third and fourth snow events, February and April 2020 respectively, caused the top and bottom chords to break. This led to the beginning of the girder truss deflection downward. The sediment layer on the roof at the north end of the subject truss was a result of this downward deflection, as any water runoff or snow melt would have ponded in that area.

The fifth event during October 202 caused the complete failure of the girder truss. Once the truss completely failed, this caused the damage to the ceiling plaster, ceiling tile, and wall plaster.

Conclusion

The analysis of available evidence related to this project supports the following:

1. There was significant damage to the wood girder truss causing it to deflect up to 12-inches downward.

2. The damage to the girder truss was caused by significant overloading as a result of one major snowfall of up to 55-inches of wet snow. Subsequent large snowfalls and water ponding contributed to the eventual, progressive complete failure of the girder truss.

3. The girder truss can be repaired in place. Both ends of the girder truss will require repair. A licensed engineer should be engaged to design the girder truss repairs and should meet the current building code requirements.

4. The girder truss to the east of the subject girder truss should also be repaired, as it is currently undergoing progressive failure similar to the subject girder truss.

Qualifications

The information presented in this summary report addressed the limited objectives related to the evaluation of the above described structure. The report only describes the conditions present at the time of our evaluation and that were readily accessible. It is not intended to fully delineate nor document every defect or deficiency throughout the subject property. If any additional information is encountered which relates to this evaluation, KMS Engineering reserves the right to alter the opinions contained in this report. In some cases, additional studies may be warranted to fully evaluate concerns noted.

No guarantee or warranty of any portion of the structures is made, either expressed or implied, nor that all conditions were observed. No physical testing, either destructive or non-destructive, was performed. No structural analysis of the structures was performed unless noted otherwise.

Our services have been performed using that degree of skill and care ordinarily exercised under similar conditions by reputable members of KMS Engineering's profession practicing in the same or similar locality at the time of performance.

Any verbal statements made before, during, or after the course of the investigation were made as a courtesy only and are not considered a part of this report.

Closing
KMS Engineering appreciates this opportunity to provide consulting services to Philadelphia Insurance Company in this matter. Please contact us should any questions arise concerning this report, or if we may be of further assistance.

Sincerely,
KMS Engineering
Keith M. Stroh, PE, MSE, SECB
Structural Engineering Consultant

APPENDIX

PHOTOGRAPHS

SNOW EVENT RECORDS

Photo No. 1: Displaced ceiling tile in auditorium at north end of girder truss.

Photo No. 2: Displaced ceiling tile in auditorium at north end of girder truss.

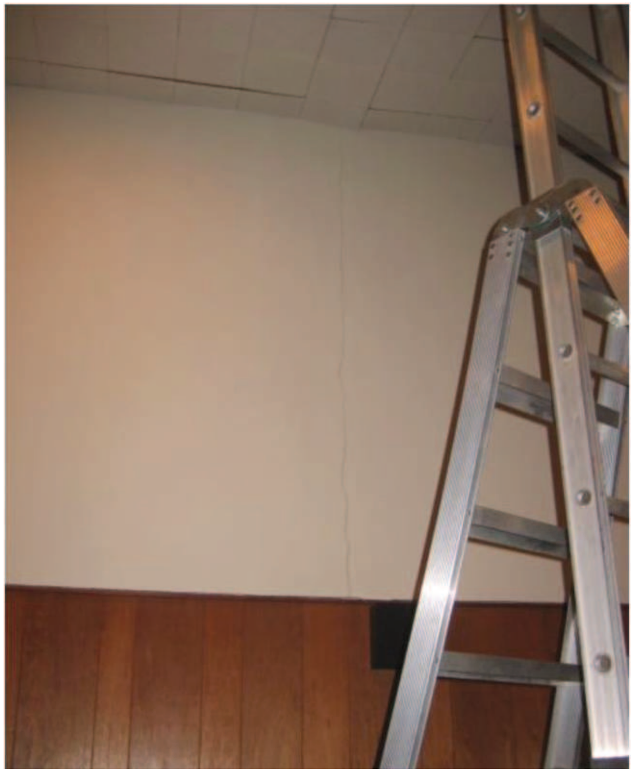


Photo No. 3: Plaster crackage at north wall of auditorium under girder truss bearing.

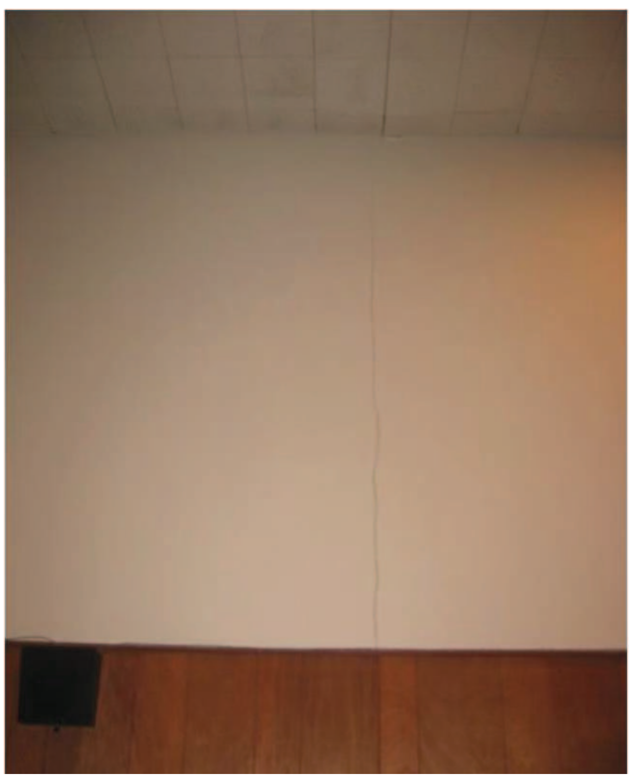


Photo No. 4: Plaster crackage at south wall of auditorium.

Photo No. 5: Deflection of ceiling tile at auditorium at north end of girder truss bearing.

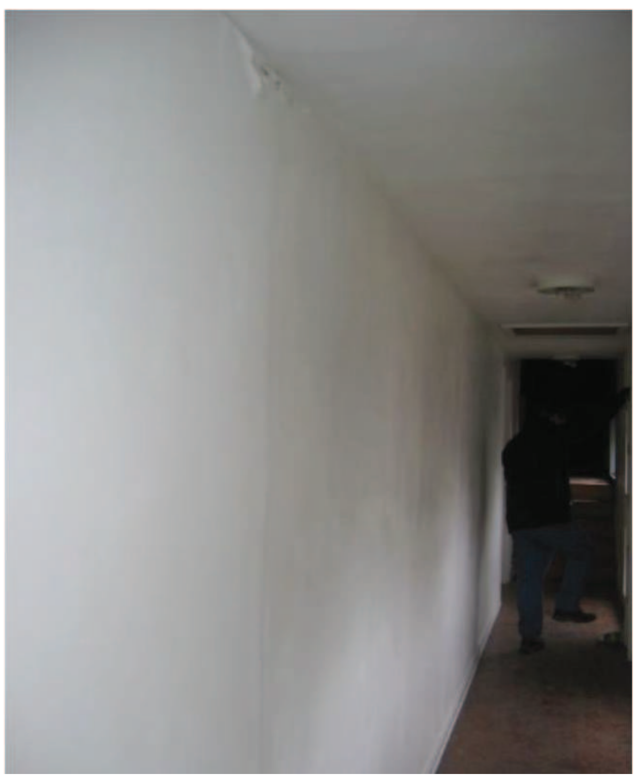


Photo No. 6: Corridor along south side of building at girder truss bearing.

Photo No. 7: Crackage at ceiling in hallway at south end of girder truss.

Photo No. 8: Crackage in plaster at hallway on south side of building under the girder truss bearing.

Photo No. 9: Overall view of broken girder truss members at north end of girder truss.

Photo No. 10: Breakage of the top chord boards at the north end of the girder truss.

Photo No. 11: Breakage of the bottom chord boards at north end of girder truss.

Photo No. 12: Breakage of diagonal chord member at north end of girder truss.

Photo No. 13: North end of girder truss, bearing at brick wall.

Photo No. 14: Diagonal chord member at south end of girder truss.

Photo No. 15: Breakage of the diagonal at south end of girder truss.

Photo No. 16: Breakage of the diagonal at south end of girder truss.

Photo No. 17: Breakage of the vertical chord member at south end of girder truss.

Photo No. 18: South end of girder truss, bearing point on brick wall.

Photo No. 19: Spacing of bottom chord boards to allow for diagonal chord members.

Photo No. 20: View of diagonal breakage at south end of girder truss.

Photo No. 21: Typical ceiling and roof framing with floor planks on west side of subject girder truss.

Photo No. 22: Typical ceiling and roof framing with floor planks on west side of subject girder truss.

Photo No. 23: Typical ceiling and roof framing on east side of subject girder truss.

Photo No. 24: Interior panel of subject girder truss. View is at the north end, looking to the west.

Photo No. 25: Interior panel of subject girder truss.

Photo No. 26: Interior panel of subject girder truss.

Photo No. 27: Interior panel of subject girder truss.

Photo No. 28: Interior panel of subject girder truss.

Photo No. 29: View of girder panel at south end of girder truss.

Photo No. 30: South end of subject girder truss.

Photo No. 31: North end of girder truss to the east of subject girder truss.

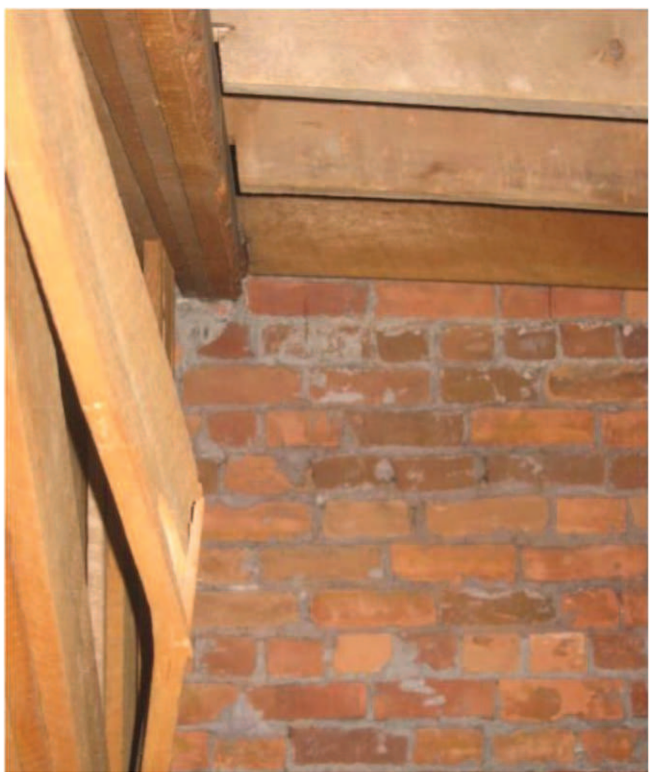


Photo No. 32: Girder truss to the east of subject girder truss. Breakage of the first panel diagonal at the north end.

Photo No. 33: North parapet at drain inlet. Note sediment from long term water ponding.

Photo No. 34: North parapet wall at girder truss.

Photo No. 35: North parapet wall, west end.

Photo No. 36: Southeast parapet wall, approximately 55-inches high.

Photo No. 37: South parapet wall.

Photo No. 38: Southwest corner of roof and parapet.

Photo No. 39: View of flyway wall at east end of lower roof.

Photo No. 40: North end of truss deflected downward.

Photo No. 41: Significant drop / deflection at north end of subject truss. Note amount of sediment from long term water ponding.

CVD Construction, Inc.
DBA DONOVAN CONSTRUCTION
514 S. 32nd St.
Spearfish, SD 57783

Phone 605-642-1747
Fax 605-642-7069

Invoice

Invoice #: 7886
Invoice Date: 1/18/2021
Due Date: 1/18/2021

Bill To:

Masonic Center Association
C/O First Interstate Bank
Casey Derflinger, President
152 Sherman Street, Deadwood SD
57732

P.O. Number:

Project

Description	Hours/Qty	Rate	Amount
LABOR		20,163.75	20,163.75T
MATERIAL		12,433.87	12,433.87T
15%		4,889.64	4,889.64T
EQUIPMENT		2,925.00	2,925.00T

Subtotal	$40,412.26
Tax Due (2.041%)	$824.81
Balance Due	$41,237.07

Masonic Center Association

Not-For-Profit Grant Program Report

2010 to 2020

Date	Grant Description of Work	Amount
09/22/2010	Tuckpointing	$2,190.00
11/02/2010	Additional Tuckpointing	$18,950.00
10/06/2011	Supplemental Heating Project	$10,443.22
04/05/2013	Sound System 3rd Floor Theatre	$3,704.00
08/05/2013	Cornerstone Repair	$2,290.00
10/15/2014	Signage Installation/Interpretation	$4,985.00
12/22/2015	Emergency Bathroom Sewer Leak	$5,500.00
12/13/2017	Scenery Evaluation	$2,500.00
02/14/2018	Water Valve Breakage	$25,493.87
05/10/2019	Display Case/Wall Cabinet*	$4,000.00
08/10/2020	Emergency Elevator Repair	$6,360.69
	** No funds Requested*	
Total Grants approved 2010 - 2020		**$86,416.78**

Approved over last five years	$38,354.56
Approved but not requested	$4,000.00
Total Used over last five years	$34,354.56
Total Grant funds alloted over five year period	$ 50,000.00
Currently available grant funds	**$15,645.44**



JAKE


JAKE
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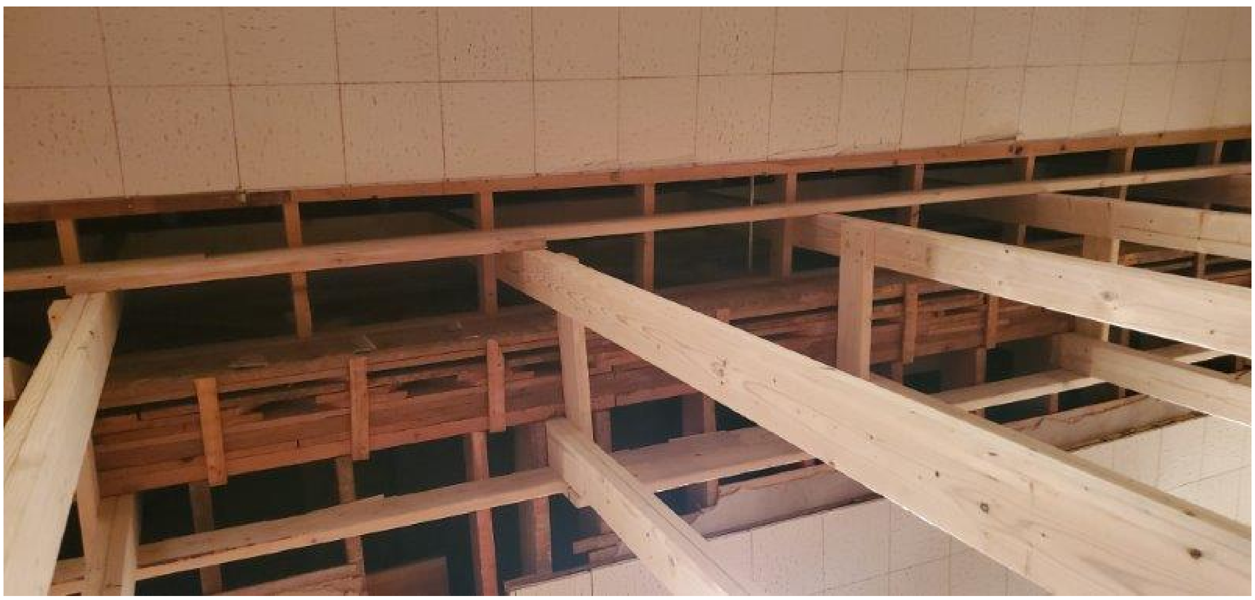
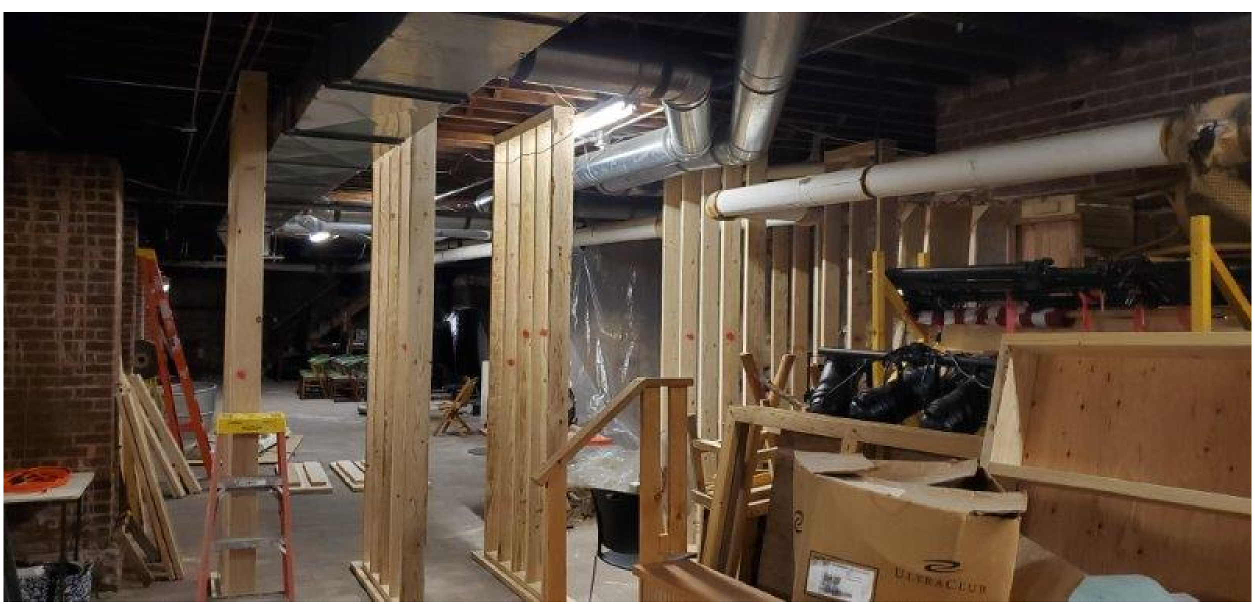
STABILIZATION MAIN FLOOR

STABILITATION 2^{ND} FLOOR


STABILIZATION 3RD FLOOR



STABILITATION BASEMENT



STABILITATION ATTIC